(No Model.) 5 Sheets—Sheet 1.

D. H. WILSON.

DYNAMO ELECTRIC MACHINE.

No. 510,460. Patented Dec. 12, 1893.

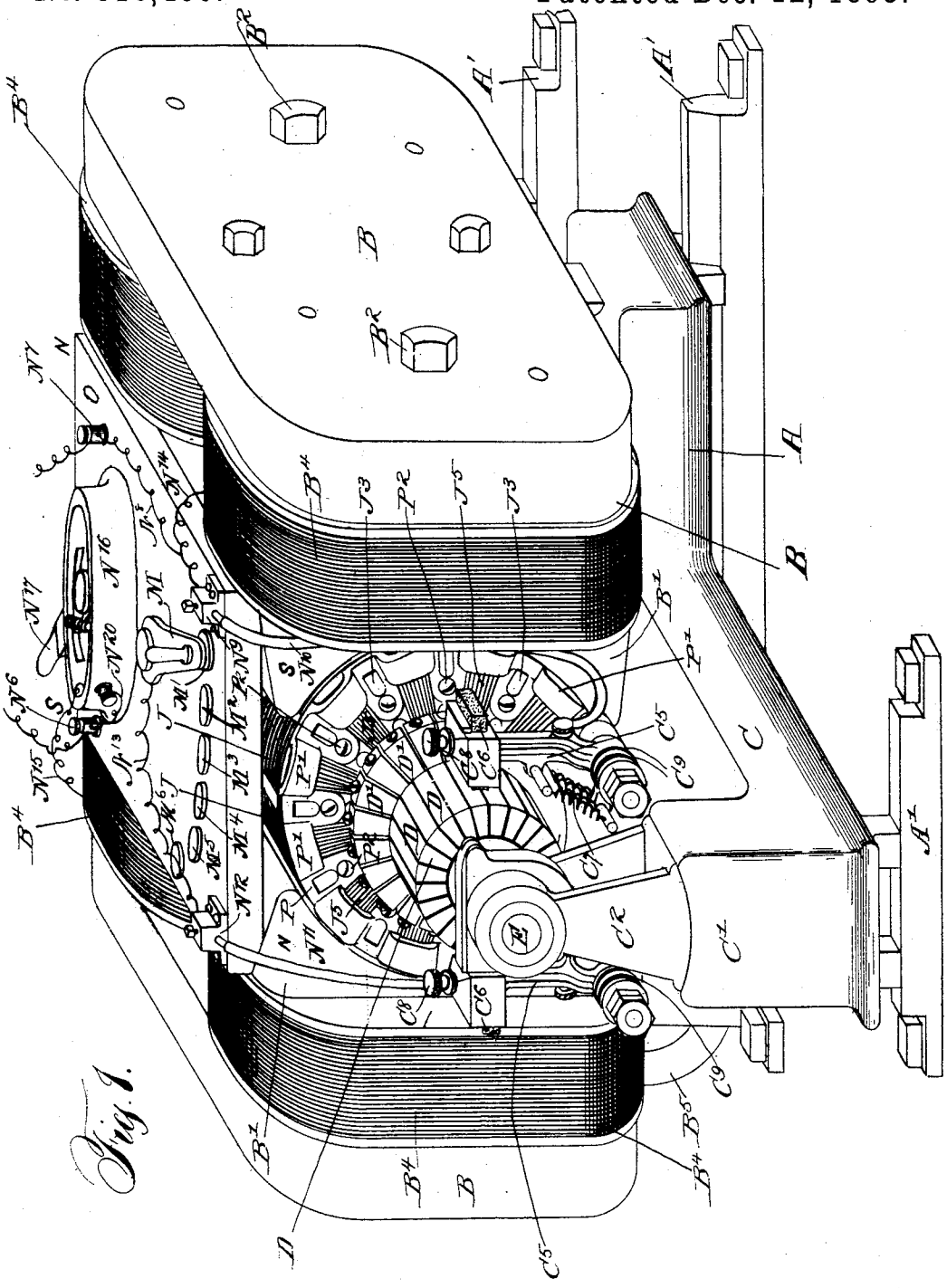

Fig. 1.

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D. H. WILSON.

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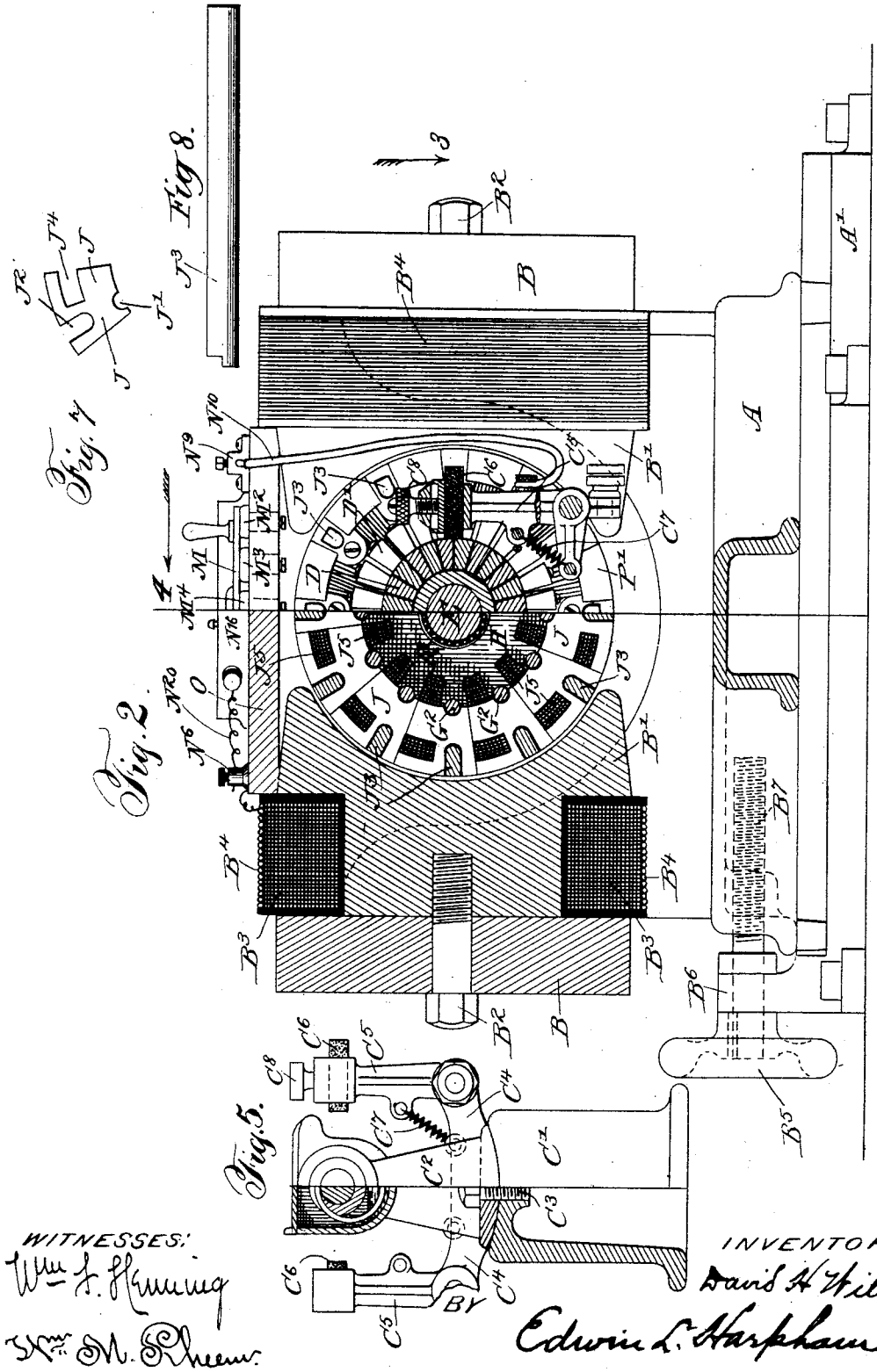

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D. H. WILSON.

DYNAMO ELECTRIC MACHINE.

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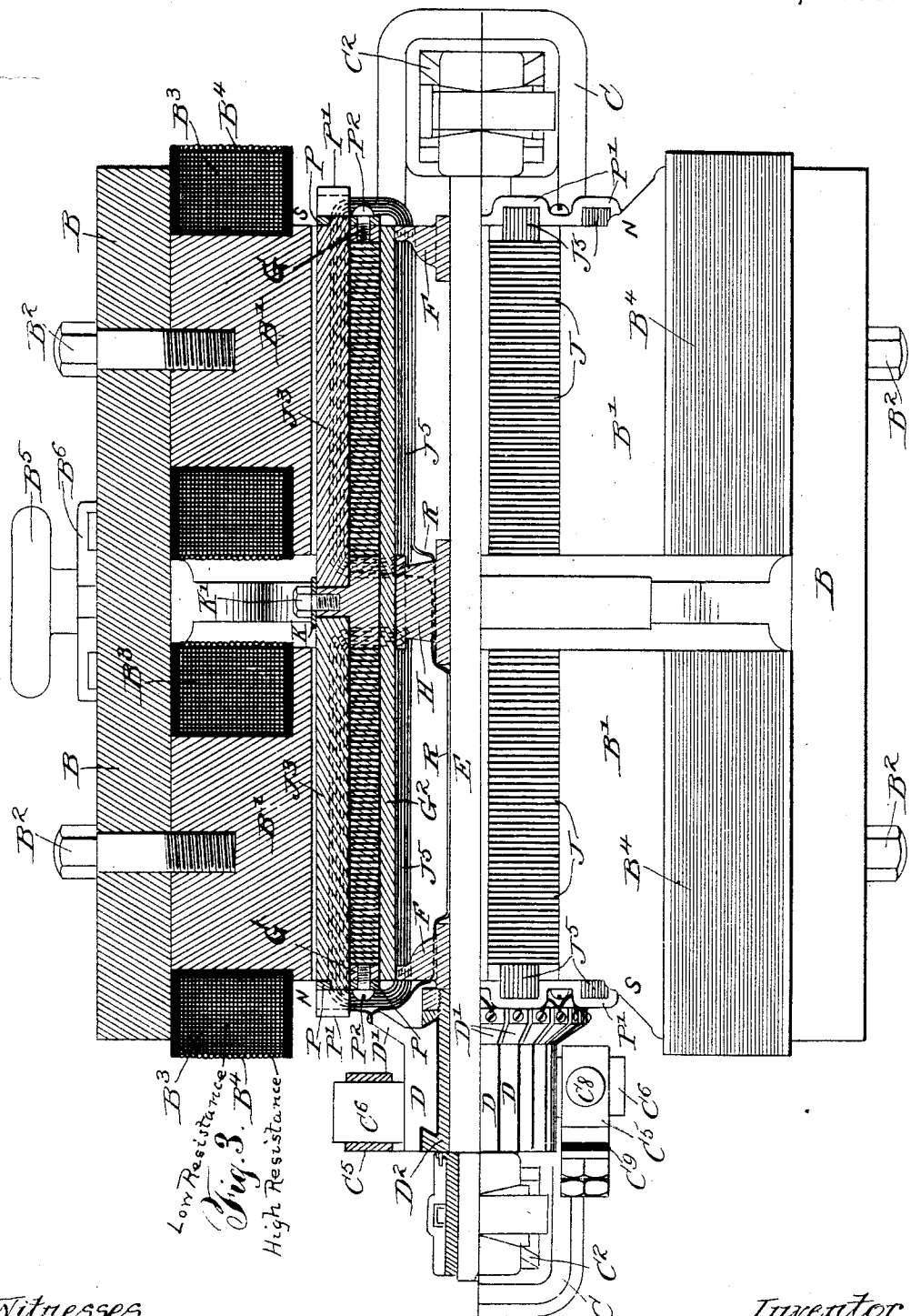

Fig. 3.

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D. H. WILSON.

DYNAMO ELECTRIC MACHINE.

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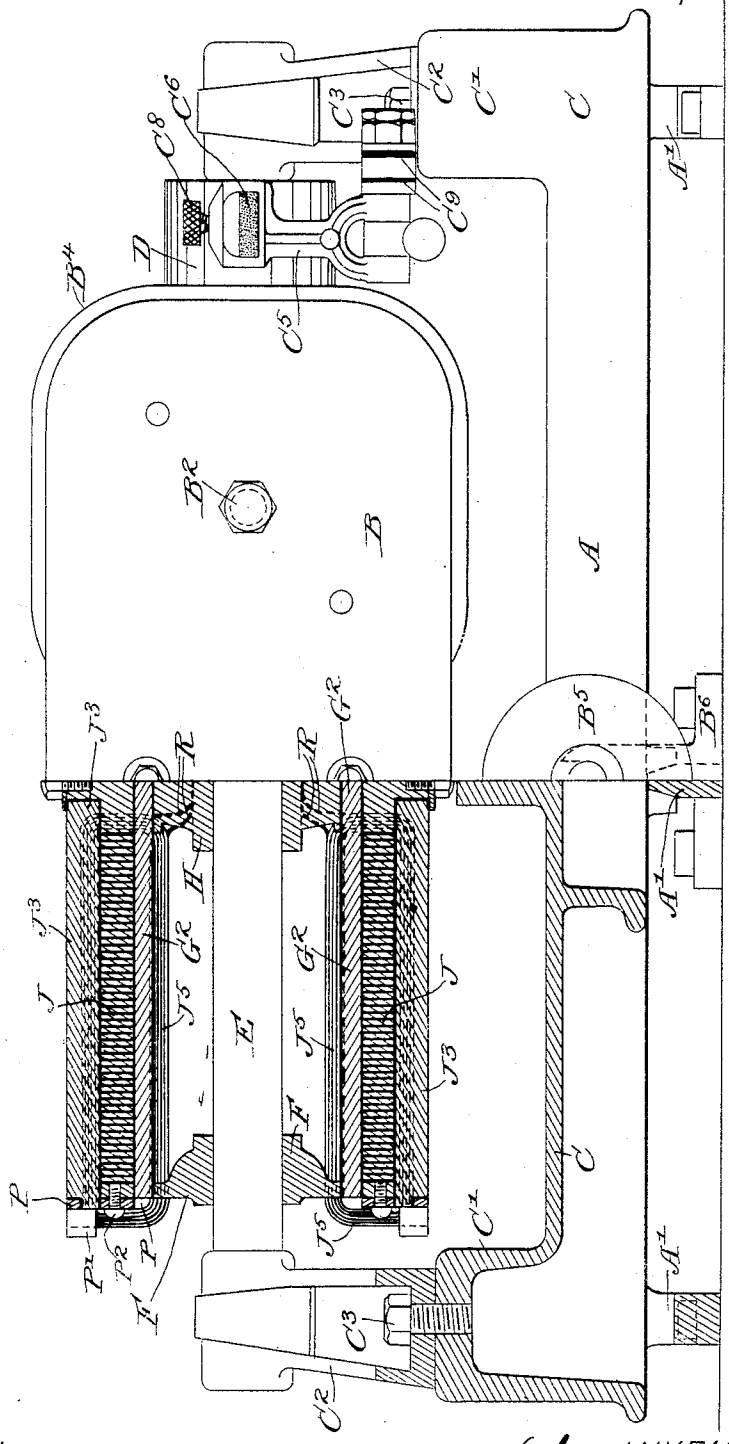

Fig. 4.

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5 Sheets—Sheet 5.

D. H. WILSON.

DYNAMO ELECTRIC MACHINE.

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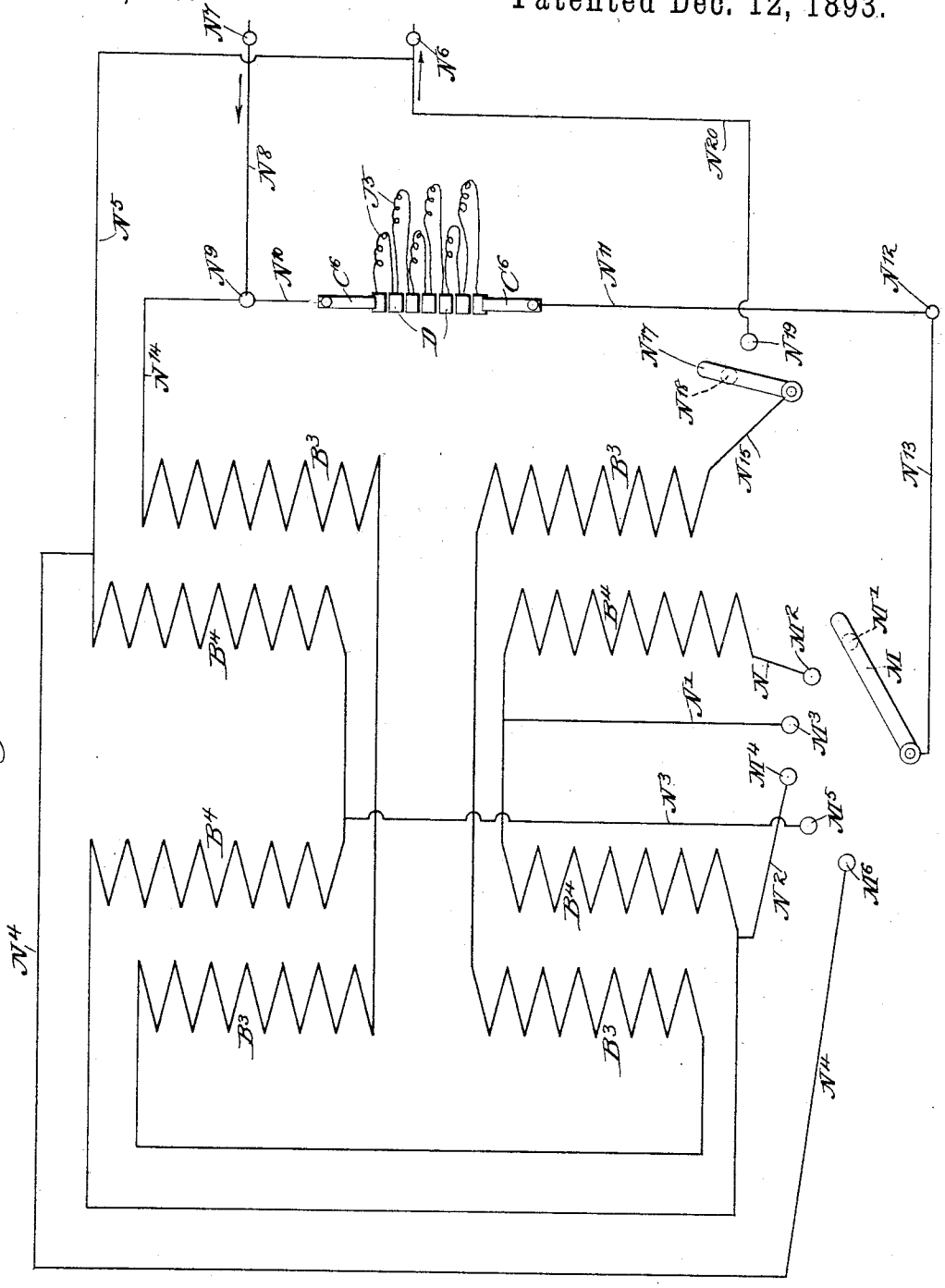

Fig 6

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UNITED STATES PATENT OFFICE.

DAVID H. WILSON, OF CHICAGO, ILLINOIS.

DYNAMO-ELECTRIC MACHINE.

SPECIFICATION forming part of Letters Patent No. 510,460, dated December 12, 1893.

Application filed December 27, 1892. Serial No. 456,601. (No model.)

To all whom it may concern:

Be it known that I, DAVID H. WILSON, a citizen of the United States, residing at Chicago, Cook county, Illinois, have invented a new and useful Improvement in Dynamo-Electric Machines, of which the following is a specification.

My invention relates to dynamo electric machines, such as are used for motors, and has for its object to provide a simple, cheap, convenient and highly efficient machine; also, to provide means for controlling the machine; also, to provide means for convenient use of double poles and armatures in one and the same mechanism, and in various improvements as hereinafter set out, and to provide a machine with a field having an exceedingly short magnetic circuit.

My invention is illustrated in the accompanying drawings wherein—

Figure 1 is a perspective view with parts removed to facilitate examination of the remaining parts. Fig. 2 is a part cross sectional and part end view. Fig. 3 is a horizontal section. Fig. 4 is a part side and part longitudinal section. Fig. 5 is a detail of the brushes and bearing. Fig. 6 is a diagrammatic view of all the circuits. Fig. 7 is a detail of one of the armature plates. Fig. 8 is a detailed view of one of the bars J^3.

Like parts are indicated by the same letter in all the figures.

A is a base plate suitably supported so as to be capable of lateral movement on the guides A′ A′.

B B are the field yokes having the inwardly projecting pole pieces B′ B′ secured thereto by the bolts B^2 B^2, the pole pieces carrying the field magnet windings B^3 B^3, and also, the exterior compound windings B^4 B^4. On one side is the hand wheel B^5 in the fixed bearing B^6 carrying the screw rod B^7, which screws into a screw-threaded portion or aperture in the base plate A whereby the machine may be moved laterally to adjust its position or tighten the belt. The frame A has projecting toward each end the portion C with the upwardly turned base C′, from which rise the standards C^2, upon which the transverse shaft is journaled. These standards are arc shaped at the lower end as indicated in Fig. 5, and are secured in position by the screws C^3 C^3. One of the standards is provided with laterally projecting arms C^4 C^4 to which are pivoted the upwardly projecting arms C^5 C^5, which carry each preferably a carbon brush C^6 C^6. Each of these standards is held by a spring C^7 so that its brush is elastically forced toward the commutator. The brushes are preferably adjusted or secured by the set screws C^8. The vertical arm is insulated by the insulation plates or pieces C^9.

D D are commutator strips having the upwardly projecting portions D′ D′ to which the ends of the armature coils are secured. These commutator blocks or strips are secured as indicated about the main shaft upon the sleeve D^2, which is secured on so as to rotate with said shaft.

E is the central driving shaft suitably provided with pulleys or the like and supported in suitable bearings. On the shaft E is placed at either end the plate or washer F, shaped preferably somewhat as shown, provided at its outer edge with the outwardly projecting portions G′ G′, formed each with a hole toward its extremity to receive the rods G^2 G^2, which run parallel with the shaft E. Midway between these plates is the plate or washer H, similarly shaped, and extending to the outer limit of the armature. The armatures proper are made up of a series of plates J shaped as shown in Fig. 7, having each the slot J′, semi-circular to receive the upper portion of the rod G^3, the slot J^2 to receive the bar J^3 and the slot J^4 to receive the upper portion of the armature coils J^5. The plate H is provided with apertures through which the rods G^2 pass, and with slotted portions through which the coils J^5 J^5 of the armature pass, or in which they rest at the ends, and also, with the outer plate K, held in position by the screws K′ so as to secure the inner ends of the bars J^3 J^3. This central plate or washer or flange H (rigid on so as to rotate with the shaft) is properly shaped on both sides so as to receive the rods, bars, armature coils, &c. M is a switch arm to control the compound windings. M′ is a dead terminal for the same.

M^2, M^3, M^4, M^5 and M^6 are terminals, from which lead the wires N, N′, N^2, N^3 and N^4. N leads to the first section of the compound winding B^4. N′ leads to the second section,

and so on, until we reach the conductor N^4, which leads to the conductor N^5, which leads to the binding post N^6, shunting all the compound windings.

N^7 is a binding post from which leads one conductor N^8 to the binding post N^9, whence leads the conductor N^{10} to one of the brushes C^6 of the armature and from the other brush leads the conductor N^{11} to the binding post N^{12}, whence leads the conductor N^{13} to the switch arm M. From the binding post N^9 leads the conductor N^{14} to the field magnet windings B^3, and the circuit is made through such field magnet windings in series, whence finally issues the conductor N^{15}, which leads to the switch blocks N^{16}, and to the switch arm N^{17} therein. This switch arm has a dead terminal N^{18} and a live terminal N^{19}, whence leads the conductor N^{20} to the binding post N^6. These several circuits are shown diagrammatically in Fig. 6, and partially in Fig. 1, the circuits being suitably completed on the lower side of the switch board O on which the switch box N^{16} rests. The armature coils are also indicated diagrammatically in Fig. 6.

P is a face plate outwardly bulged at P′ P′ and secured on the outer extremities of the portions F by means of the screws P^2 P^2.

It will be observed that the poles and armatures are arranged in two sets, the armature coils to each end being wound so as to be about the length of the pole pieces between which they lie, and the terminal wires of the coils R R are carried through the center plate H, being suitably insulated, and together with the terminals of the coils lying next to the commutator are attached to the strips D′ thereof.

It is evident that many of the features and details of the construction which I have here illustrated could be varied and altered without departing from the spirit of my invention. I do not wish to be limited to the specific construction shown. Many of the features which I have exhibited might be employed separately and in connection with the remaining features, or with other elements. Variations in size, form, construction and relation of the several parts will necessarily follow the adaptation of the main features of my invention to the various circumstances for which such machines are required.

The use and operation of my invention are as follows: Referring to the diagrammatic portions of the drawings and the relation of the windings, switches, &c., it will be seen that I provide four pole pieces wound in series,—also, four compound windings in series, but so as to be successively cut out of circuit, and armature coils in series with such of the compound windings as are in circuit. These compound windings are also resistances, and serve the purpose of resistances as such are commonly used in the control of dynamo-electric machines, and are made of German silver, or some such material, to secure a large surface to prevent over heating. Referring to the circuits, I assume that the current enters at the binding post N^7, and passes to the post N^9, whence by the conductor N^{14} it is carried to the field magnet coils B^3, traversing them in series, and emerging at the conductor N^{15} which leads into the switch box, along the switch arm N^{17} to the terminal N^{19}, and thence by the conductor N^{20} to the opposite binding post N^6. Thus when the switch arm N^{17} is operated the field magnets are in circuit in series. Now by placing the switch arm M on the terminal M^2, it will be seen that the armature and compound windings are also placed in a circuit, but in shunt of the field, and the current passes from the binding post N^9 to conductor N^{10} to the brush C^6, thence through the armature coils, commutator strips, &c., to the opposite brush C^6, to conductor N^{11}, binding post N^{12} to switch arm M, to terminal M^2 to conductor N, and thence successively through the several compound coils B^4 B^4 to conductor N^5 to binding post N^6. By moving the switch arm M from terminal to terminal, it will be observed that I successively cut out the compound windings.

Referring to the constructional features of the device, it will be observed that the armature proper is composed of the three rings or washers, one at each end, and one midway of the shaft. They are keyed to the shaft so as to rotate therewith. Through them are placed the rods G^2 and on these rods are disposed the several plates of which the armature cores are composed. They are suitably insulated as desired. When one row of these plates has been put into position, the armature coil previously prepared is slipped into position surrounded by a core portion made by the projections on the plate J so that the upper portion of the coil lies in the slots J^4. Then another row of plates J is put into position and so on until the armature is completed. The bars J^3 are then slipped into the slots J^2, their inner ends being secured in position by the plate K. The face plates P are then brought into position on the outer end and securely fastened with the screws P^2. Thus it will be seen that the armature has been built up, and that any section of the armature can be removed by simply removing the face plate on that side of the armature, disconnecting the parts and raising out the wedge-shaped portion or section which it is desired to replace. The terminal wires of the section or coil farthest from the commutator are carried through the plate H, and through the end plate F and fastened to the commutator strips.

I claim—

1. In a dynamo electric machine, an armature composed of a series of wedge shaped sections carrying each a coil, said sections composed of a series of slotted wedge shaped plates with rods therethrough to hold them together, said slots being so arranged that the coils can be slipped on or off the said sections,

and a shaft with supporting plates thereon to which the rods are secured.

2. In a dynamo electric machine, an armature consisting of a series of plates wedge-shaped in plan and slotted, coils parallel to the shaft and laid in such slots, said plates being held in place by rods fitting into slots at the top and bottom of such plates and fastened to plates or spiders on the shaft.

3. In a dynamo electric machine, the combination of an armature shaft with plates thereon, rods which pass into such plates being supported thereby and are parallel with the shaft, armature sections composed of transverse plates slotted, and coils resting in such slots, said plates adapted to rest on such rods, and longitudinal bars between which and the rods such armature sections are secured.

4. In a dynamo electric machine, the combination of a shunt and series field magnet windings wound so as to aid each other when the dynamo electric machine is run as a motor, the series coils being used as a resistance in starting the motor.

5. In an electric motor, the combination of shunt and series field magnet windings, wound so as to aid each other, the series windings being in sections and of comparatively high resistance, said sections controlled by a switch so that they can be thrown out, one at a time, when starting the motor.

6. In a dynamo electric machine, the combination of two short magnets, united by an external yoke with two similar opposed magnets, said magnets having inwardly projecting pole pieces and an armature consisting of two sets of coils, one set between each pair of poles, each set having one end attached to a common plate or spider, and a suitable shaft and commutator and connections from both sets of coils to such commutator.

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